

09/730,672

REMARKS

This application has been reviewed in light of the Office Action dated September 11, 2002. Claims 1-7 are now presented for examination. Claims 1 and 2 have been amended to more particularly point out and distinctly claim the subject matter regarded as the invention. Claim 1 is the only independent claim. Favorable review is respectfully requested.

A marked-up version of the amended claims, showing the changes made thereto, appears in an Appendix to this Amendment.

Claims 1-7 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter regarded as the invention.

With regard to claim 1, the Examiner stated that it was unclear whether the power used in the lighting step (exceeding the power required to maintain a capacitive plasma) was introduced as such, or increased after lighting the capacitive plasma. The claim has been amended to recite a lighting step wherein a plasma is lit in accordance with the preset matching condition and at a desired power, where the desired power includes (1) a power required to maintain that plasma as a capacitive plasma and (2) an excess power. As taught in the specification (page 7, lines 4-10), a capacitive plasma is efficiently ignited at these conditions, and remaining power (that is, the excess power) is available to light an inductive plasma. This lighting step is also shown in the figures in Fig. 4, steps 401 and 402.

With regard to claim 2, the Examiner stated that the terms "first plasma" and "second plasma" were confusing. Claims 1 and 2 have been amended to recite that two distinct plasmas are lit. In the determining step of claim 1, the matching network is tuned to a first plasma as a capacitive

09/730,672

plasma. Claim 2 explicitly recites lighting this first plasma as part of the determining step. In the lighting step of claim 1, the second plasma is lit in accordance with the preset matching conditions. As taught in the specification (page 6, line 23, to page 7, line 1), the matching conditions are determined by lighting a plasma (the first plasma) and allowing the matching network to tune to this plasma as a capacitive plasma. (See also Fig. 3, steps 301-304). It should be noted that in the second plasma, a capacitive plasma is first ignited, then an inductive plasma (specification, page 7, lines 3-16; Fig. 4, steps 401-404). The power level for the second plasma includes (1) power required to maintain the second plasma as a capacitive plasma and (2) additional power sufficient to cause an inductive plasma to light (this power is characterized as the excess power, since it is not required to maintain a capacitive plasma).

It is believed that all of the claims here presented are fully in compliance with 35 U.S.C. § 112. The Examiner is requested to contact the undersigned attorney by telephone to discuss any changes to the claim language deemed necessary.

Claims 1-7 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Nallan et al. (U.S. Pat. No. 6,399,507). Applicants respectfully submit that amended independent claim 1 is patentable over the art cited by the Examiner, for the following reasons.

The present invention, as defined in claim 1, is directed to a method for lighting an inductive plasma in a plasma processing apparatus having a matching network. It is a feature of the invention that a matching condition is determined under which the matching network is tuned to a capacitive plasma, and the matching network is preset at those conditions.

Nallan et al. is understood to disclose a plasma process in which a stable inductively coupled plasma is maintained.

09/730,672

Nallan et al. teaches that this should be done by controlling the RF power input and the gas pressure in the plasma chamber, which then controls the plasma density (col. 2, line 64, to col. 3, line 8; col. 5, lines 48-50; col. 11, lines 40-47). The applicants wish to point out that the teachings of Nallan et al. apply to a plasma that is already lit, as opposed to determining conditions for lighting the plasma. ←

The Examiner is correct in his statement that Nallan et al. does not teach presetting matching network conditions for lighting the plasma. The Examiner further states that it would have been obvious from Nallan et al. to determine the preset conditions for the matching network; this statement is respectfully traversed. Clearly, one skilled in the art would have found it desirable to determine and preset optimum conditions for lighting the plasma; but Nallan et al. is silent as to how this may be done. Specifically, Nallan et al. offers no motivation to preset conditions under which the network is tuned to a capacitive plasma, as in the present invention. ↗

One following the teachings of Nallan et al. would be motivated to set a gas pressure and RF power before lighting the plasma, but would not be motivated to determine any other pre-lighting conditions. Indeed, the applicants have not found in Nallan et al. any mention of matching network conditions, let alone preset matching network conditions under which a capacitive plasma may be lit.

Accordingly, it is respectfully submitted that Nallan et al. does not teach or suggest the above-described features of the present invention, so that the present invention would not have been obvious therefrom.

A review of the other art of record has also failed to yield a disclosure or suggestion of the above-described features of amended independent claim 1. Accordingly, it is submitted that the present invention is likewise patentable over that art.

09/730,672

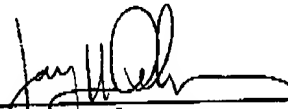
The other claims in this application are each dependent from the independent claim discussed above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual consideration of the patentability of each on its own merits is respectfully requested.

CONCLUSION

In view of the foregoing amendments and remarks, Applicants respectfully request favorable consideration and early passage to issue of the present application.

Applicants' undersigned attorney may be reached by telephone at (845) 894-3667. All correspondence should continue to be directed to the below listed address.

Respectfully submitted,



Jay H. Anderson
Attorney for Applicants
Registration No. 38,371

INTERNATIONAL BUSINESS MACHINES CORPORATION
Intellectual Property Law Department
B/300-482
2070 Route 52
Hopewell Junction, New York 12533
Facsimile: (845) 892-6363

09/730,672

APPENDIX

1 1. (Amended) A method for lighting an inductive plasma in a
2 plasma processing apparatus having a matching network, the method
3 comprising the steps of:

4 determining a matching condition under which the matching
5 network is tuned to a first plasma as a capacitive plasma;

6 presetting the matching network at the matching condition
7 determined in said determining step;

8 lighting a second [capacitive] plasma in accordance with the
9 preset matching condition and at a desired power, where the
10 desired power includes [exceeding] a power required to maintain
11 the second plasma as a [the] capacitive plasma and [by] an excess
12 power; and

13 allowing an inductive plasma to light due to the excess
14 power.

1 2. (Amended) A method according to claim 1, wherein [the plasma
2 lit in said lighting step is a second plasma, and] said
3 determining step further comprises:

4 lighting the [a] first plasma;

5 setting a power delivered to the first plasma at not more
6 than about 20 watts;

7 allowing the matching network to tune to the first plasma as
8 a capacitive plasma; and

9 recording the matching condition under which the matching
10 network is tuned to the first plasma.